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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**



APPLICANT: Niwa EXAMINER: Akkapeddi, Prasad R.
SERIAL NO.: 09/767,588 GROUP ART UNIT: 2871
FILED: January 23, 2001 Docket: 8728-470
FOR: LIQUID CRYSTAL DISPLAY AND METHOD FOR
MANUFACTURING LIQUID CRYSTAL DISPLAY

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Respectfully submitted,


Nathaniel T. Wallace
Reg. No. 48,909
Attorney for Applicant(s)

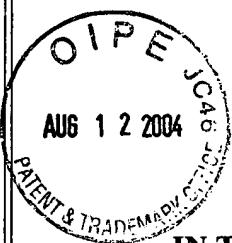
F. CHAU & ASSOCIATES, LLC
130 Woodbury Road
Woodbury, NY 11797
Tel: (516) 692-8888
Fax: (516) 692-8889

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Dated: August 9, 2004


Nathaniel T. Wallace



PATENTS

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APPEAL BRIEF

In response to the Final Office Action dated December 5, 2003 finally rejecting Claims 1-7, 9-12 and 16-21 under 35 U.S.C. §103(a) and 35 U.S.C. 102(e), Applicants appeal pursuant to the Notice of Appeal filed on June 7, 2004 and submit this appeal brief.

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1. Real Party in Interest

The real party in interest is International Business Machines Corporation, the assignee of the entire right, title, and interest in and to the subject application by virtue of an assignment of record.

2. Related Appeals and Interferences

None.

3. Status of Claims

Claims 1-3, 5, 6, 9-11 and 16-21 are pending, stand rejected, and are under appeal.

A copy of the Claims 1-3, 5, 6, 9-11 and 16-21 as pending is presented in the Appendix.

4. Status of Amendments

Claim 2 was amended, Claims 16-21 were added, and Claims 13-15 were cancelled by Amendment under 37 C.F.R. §1.111 filed September 18, 2003. This Amendment was entered.

Claims 1, 6, 8, and 18 were amended and Claims 4, 7 and 12 were cancelled by Amendment under 37 C.F.R. §1.116 filed February 5, 2004. This Amendment was entered by the Supplemental Advisory Action dated June 10, 2004.

5. Summary of the Invention

The present invention relates to a liquid crystal display, and in particular to a liquid crystal display comprising a sealing material for sealing the peripheral portion between two substrates, and an end-sealing material for sealing an injection hole in the sealing material for receiving liquid crystal.

In an active matrix liquid crystal display using thin film transistors, liquid crystal is sealed between a thin film transistor (TFT) array substrate, which has gate electrodes (Y-electrodes) and data electrodes (X-electrodes) arranged in a matrix and has TFTs placed at the intersection points of them, and an opposing substrate overlaid with a gap between the TFT array substrate. A voltage applied to the liquid crystal is controlled by the thin film transistors to enable display by using the electro-optic effect of the liquid crystal.

A sealing material is used to seal liquid crystal between the two substrates and protect the liquid crystal from external pollution. The sealing material is formed in the peripheral portion of one substrate. After placing the other substrate on the substrate on which the sealing material is formed, they are pressed and heated to a fixed degree to bond the two substrates by means of the sealing material. Further, in part of the sealing material, there is provided an opening, which is an injection hole for subsequent injection of the liquid crystal.

After the two substrates are bonded together by the sealing material, a volume formed by the sealing material between the substrates is evacuated, and the liquid crystal is injected through the injection hole. Thereafter, the end-sealing material seals the liquid crystal in the volume.

Injection hole post structures are formed in an area near the injection hole to prevent pollutants seeped from the end-sealing material and the sealing material from penetrating into the pixel area (display area), thereby suppressing the occurrence of picture quality degradation in the

pixel area near the injection hole. The end-sealing material seals the injection hole after the liquid crystal is injected, and the injection hole post structures provided in the area near the injection hole divide the injection hole into a plurality of portions. The injection hole post structures prevent pollutants from expanding into the display area from the end sealing material and the sealing material around the injection hole.

6. Issues

- A.** Whether Saito et al. (U.S. Patent No. 6,304,308) renders obvious Appellants' Claim 1.
- B.** Whether the combined teachings of Saito et al. (U.S. Patent No. 6,304,308) and Nakanowatari (U.S. Patent No. 4,820,025) renders obvious Appellants' Claim 6.
- C.** Whether Saito et al. (U.S. Patent No. 6,304,308) anticipates Appellants' Claim 9.

7. Grouping of Claims

- Group I: Claims 2, 3, 5, 16 and 17 stand or fall with Claim 1.
- Group II: Claims 8, 18 and 19 stand or fall with Claim 6.
- Group III: Claims 10, 11, 20 and 21 stand or fall with Claim 9.

8. Argument

A. Introduction

In rejecting claims under 35 U.S.C. §103, the Examiner bears the initial burden of presenting a *prima facie* case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532 (Fed. Cir. 1993). The burden of presenting a *prima facie* case of obviousness is only satisfied by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. In re Fine, 837 F.2d 1071, 1074 (Fed. Cir. 1988). A *prima facie* case of obviousness is established when the teachings of the prior art itself would appear to have suggested the claimed subject matter to one of ordinary skill in the art. In re Bell, 991 F.2d 781, 782 (Fed. Cir. 1993). If the Examiner fails to establish a *prima facie* case, the rejection is improper and must be overturned. In re Rijckaert, 9 F.3d at 1532 (citing In re Fine, 837 F.2d at 1074).

It is respectfully submitted that at the very least, Saito is legally deficient to establish a *prima facie* case of obviousness against independent claim 1, and that the combined teachings of Saito and Nakanowatari are legally deficient to establish a *prima facie* case of obviousness against independent claim 6.

Under 35 U.S.C. §102, a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the claim. See MPEP §2131.

It is respectfully submitted that at the very least, Saito is legally deficient to establish a case of anticipation against independent claim 9.

Therefore, for the reasons set forth below, Appellants respectfully request that the claim rejections under 35 U.S.C. §103 and 35 U.S.C. §102 be overruled.

B. The Claim Rejections Under 35 U.S.C. 103 Are Legally Deficient.

The teachings of Saito fail to teach or suggest the claimed device including “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough” as claimed in Claim 1. With respect to Claim 6, the combined teachings of Saito and Nakanowatari fail to teach or suggest “said sealing material at an acute angle when said injection hole is formed.”

Claim 1 claims, *inter alia*, “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough.” By the Amendment under 37 C.F.R. §1.116 filed February 5, 2004, Claim 1 has been amended to include the limitations of Claim 4. Claim 6 recites, *inter alia*, “a sealing material for connecting a pair of substrates outside the display area, and forming an open injection hole for injecting liquid crystal therethrough, wherein said sealing material has a projecting portion formed by bending said sealing material at an acute angle when said injection hole is formed; an end-sealing material for sealing said injection hole after said liquid crystal is injected.” By the Amendment under 37 C.F.R. §1.116 filed February 5, 2004, Claim 6 has been amended to include the limitations of Claim 7.

The Saito reference is legally deficient to establish a *prima facie* case of obviousness against Claim 1 because Saito does not teach or suggest “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough,” as claimed in Claim 1. Saito teaches a strip spacer

(SPC-S) having an injection port (see col. 8, lines 45-48, and col. 8, line 66 to col. 9, line 6). The strip spacer material of Saito does not perform a sealing function (see col. 8, lines 15-24). The strip spacers (SPC-S) ensures a cell gap and buffers the liquid crystal from the seal material (SL) (see col. 8, lines 25-40). However, Saito teaches that liquid crystal overflows and extrudes out of the strip spacer (SPC-S) (see col. 8, lines 15-24). Thus, the strip spacer (SPC-S) is not a seal material. The strip spacer (SPC-S) and cell gap is sealed only when the seal material (SL) is deposited around the strip spacer (SPC-S) (see col. 8, lines 63-65). Further, nowhere does Saito teach or suggest that the seal material (SL) comprises an injection port. For example, Saito clearly identifies the heavy lines in the injection port of Figure 8 as seal material (SL), wherein the seal material (SL) is deposited after liquid crystal injection (see col. 8 lines 63-65) and seals the injection hole in the strip spacer (SPC-S) (see col. 8, lines 63 to col. 9, line 6, and col. 11, lines 60-65). Nowhere does Saito teach or suggest that the seal material (SL) is deposited so as to form an injection port for injecting liquid crystal therethrough, because, among other things, the liquid crystal has already been injected when the seal material (SL) is deposited. Thus, Saito does not teach or suggest “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough” as claimed in Claim 1. Therefore, Saito fails to teach or suggest all the limitations of Claim 1.

Referring now to Claim 6, the combined teachings of Saito and Nakanowatari are legally deficient to establish a *prima facie* case of obviousness against Claim 6 because Saito and Nakanowatari do not teach or suggest “sealing material has a projecting portion formed by bending said sealing material at an acute angle when said injection hole is formed.”

Saito teaches an injection hole formed in a strip spacer (SPC-S) formed as a rectangle (see Figures 2 and 8). No portion of the strip spacer (SPC-S) of Saito is bent at an acute angle. The seal material (SL) formed around the strip spacer (SPC-S) will conform to the angles of the strip spacer (SPC-S), and thus will conform to the right angles of the strip spacer (SPC-S). Therefore, Saito fails to teach or suggest all the limitations of Claim 6.

Nakanowatari teaches one part of a sealing member 3 is opened to constitute an injection hole 5 formed at a corner position of the substrates (see col. 3, lines 7-10 and Figure 3).

Nakanowatari does not teach or suggest that a “sealing material has a projecting portion formed by bending said sealing material at an acute angle when said injection hole is formed” as claimed in Claim 6. It is clear from Figure 3 of Nakanowatari that the portion of the sealing member 3 forming the injection hole 5 is bent at an angle greater than 90 degrees, an obtuse angle.

Nakanowatari does not teach or suggest bending a sealing material at an acute angle, essentially as claimed in Claim 6. Therefore, Nakanowatari fails to sure the deficiencies of Saito.

The combined teachings of Saito and Nakanowatari fail to teach or suggest “a sealing material for connecting a pair of substrates outside the display area, and forming an open injection hole for injecting liquid crystal therethrough, wherein said sealing material has a projecting portion formed by bending said sealing material at an acute angle when said injection hole is formed” as claimed in claim 6.

Because Saito neither teaches nor suggests each and every element of Claim 1, and the combined teachings of Saito and Nakanowatari fail to teach or suggest every limitation of Claim 6, it is respectfully asserted that no case of anticipation has been made out.

Claims 2, 3, 5, 16 and 17 depend from Claim 1. Claims 8, 18 and 19 depend from Claim 6. The dependent claims include the elements of their respective independent claims and they are

not rendered unpatentable by the cited references for at least the reasons given for the independent claims.

C. The Claim Rejections Under 35 U.S.C. 102 Are Legally Deficient.

Saito fails to teach the claimed device including “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough” as claimed in Claim 9.

Saito teaches a strip spacer (SPC-S) having an injection port (see col. 8, lines 45-48, and col. 8, line 66 to col. 9, line 6). The strip spacer material of Saito does not perform a sealing function (see col. 8, lines 15-24). The strip spacers (SPC-S) ensures a cell gap and buffers the liquid crystal from the sealing material (SL) (see col. 8, lines 25-40). However, Saito teaches that liquid crystal overflows and extrudes out of the strip spacer (SPC-S) (see col. 8, lines 15-24). Thus, the strip spacer (SPC-S) is not a sealing material. The strip spacer (SPC-S) and cell gap is sealed only when the seal material (SL) is deposited around the strip spacer (SPC-S) (see col. 8, lines 63-65). Further, nowhere does Saito teach that the sealing material (SL) comprises an injection port. As stated with respect to Claim 1, Saito clearly identifies the heavy lines in the injection port of Figure 8 as seal material (SL), wherein the seal material (SL) is deposited after liquid crystal injection (see col. 8 lines 63-65) and seals the injection hole in the strip spacer (SPC-S) (see col. 8, lines 63 to col. 9, line 6, and col. 11, lines 60-65). Saito does not teach or suggest that the seal material (SL) is deposited so as to form an injection port for injecting liquid crystal therethrough, because, among other things, the liquid crystal has already been injected when the seal material (SL) is deposited. Thus, Saito does not teach “a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection

hole for injecting said liquid crystal therethrough" as claimed in Claim 9. Therefore, Saito fails to teach all the limitations of Claim 9.

Claims 10, 11, 20 and 21 depend from Claim 9. The dependent claims include the elements of their respective independent claims and they are not rendered unpatentable by Saito for at least the reasons given for the independent claims.

Accordingly, the rejection of Claims 1-3, 5, 6, 9-11 and 16-21 should be overruled.

D. CONCLUSION

The claimed invention is not disclosed or suggested by the teachings of the applied prior art references, either alone or in combination. Moreover, the Examiner has failed to establish a *prima facie* case of obviousness of the presently claimed method under 35 U.S.C. §103 over Saito with respect to Claim 1, and Saito and Nakanowatari with respect to Claim 6, for at least the reasons noted above. Further, the Examiner has failed to establish a case of anticipation of the presently claimed method under 35 U.S.C. §102 over Saito with respect to Claim 9 for at least the reasons noted above. Accordingly, it is respectfully requested that the Board overrule the rejection of Claims 1-3, 5, 6, 9-11 and 16-21 under 35 U.S.C. §103 and 35 U.S.C. §102.

Date: Aug 9, 2004

By:


Nathaniel T. Wallace
Reg. No. 48,909
Attorney for Appellants

F. CHAU & ASSOCIATES, LLP
130 Woodbury Road
Woodbury, New York 11797
TEL: (516) 692-8888
FAX: (516) 692-8889

APPENDIX

What is claim is:

1. A liquid crystal display having a first substrate and a second substrate which are disposed with a predetermined gap therebetween, in which liquid crystal is sealed in said gap, comprising:
 - post structures for controlling the gap between said first substrate and said second substrate;
 - a sealing material provided outside a display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough;
 - an end-sealing material for sealing said injection hole after said liquid crystal is sealed in; and
 - injection hole post structures provided in an area near said injection hole, for dividing said injection hole into a plurality of portions by using the same material as said post structures, wherein said injection hole post structures are formed from a material which deteriorates a charge retention of said liquid crystal less than said sealing material.
2. The liquid crystal display according to Claim 1, wherein said injection hole post structures divide the width of said injection hole into 0.1 millimeter to 3 millimeters.
3. The liquid crystal display according to Claim 1, wherein said injection hole post structures are formed with a height lower than the height of the gap formed by said first substrate and said second substrate.

5. The liquid crystal display according to Claim 1, wherein said injection hole post structures are formed at a position where part of them are in contact with said end-sealing material.

6. A liquid crystal display, comprising:

 a sealing material for connecting a pair of substrates outside the display area, and forming an open injection hole for injecting liquid crystal therethrough, wherein said sealing material has a projecting portion formed by bending said sealing material at an acute angle when said injection hole is formed;

 an end-sealing material for sealing said injection hole after said liquid crystal is injected; and

 a penetration suppressor provided near a connection portion between said sealing material and said end-sealing material for suppressing the penetration of a pollutant generated from said connection portion into said display area.

8. The liquid crystal display according to Claim 6, wherein said penetration suppressor is a pair of post structures which is close to said projecting portion and extending from the vicinity of the substrate end in said injection hole to said display area.

9. A liquid crystal display in which liquid crystal is sealed in the gap formed by a pair of substrates to display pictures on a display area, comprising:

 post members formed, after a pattern, on one substrate of said pair of substrates for controlling said gap;

a sealing material provided outside said display area for sealing said liquid crystal in said gap, and forming an open injection hole for injecting said liquid crystal therethrough;

an end-sealing material for sealing said injection hole after said liquid crystal is sealed in; and

a plurality of injection hole post structures provided between the substrate end in said injection hole and said display area on said one substrate, and formed after a pattern similarly to said post members, for preventing the pollutant seeped from said end-sealing material from penetrating into said display area.

10. The liquid crystal display according to Claim 9, wherein said plurality of injection hole post structures forms injection hole post structures of a plurality of rows toward said display area from a position close to the substrate end in said injection hole.

11. The liquid crystal display according to Claim 10, wherein those of the injection hole post structures forming said plurality of rows which are close to the substrate end in said injection hole are disposed at the position where they are in contact with said end-sealing material.

16. The liquid crystal display according to Claim 1, wherein adjacent injection hole post structures are separated by a width that is at least double a predetermined expansion distance of a pollutant from the end-sealing material, wherein a distance to the display area is greater than double the width.

17. The liquid crystal display according to Claim 1, wherein said first substrate is a color filter substrate and said second substrate is an array substrate.
18. The liquid crystal display according to Claim 6, wherein said penetration suppressor is formed with a height lower than a height of a gap formed between the pair of substrates.
19. The liquid crystal display according to Claim 6, wherein said pair of substrates comprises a color filter substrate and an array substrate.
20. The liquid crystal display according to Claim 9, wherein injection hole post structures are formed with a height lower than a height of a gap formed between the pair of substrates.
21. The liquid crystal display according to Claim 9, wherein said first substrate is a color filter substrate and said second substrate is an array substrate.